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IN THREE SECTIONS

## Section I

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## Rebuilding Antiquated Cost Systems

and

## Punched Hole Accounting

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# Rebuilding Antiquated Cost Systems

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and

# Punched Hole Accounting

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## EDITORIAL DEPARTMENT NOTE

Most of the attempts toward better organization and the more effective use of cost accountant's services in industry must start with a situation which is already in existence. Very few cost accounting systems are designed at the outset with enough foresight so that future changes in the business can be fitted satisfactorily into the existing system.

Our papers this time deal with two subjects which are of interest to practically every cost accountant. The first paper handles the question of finding out where an existing system is inadequate and suggesting the remedy therefor. The second paper presents a description of an installation of mechanical equipment which has been of decided benefit to the particular firm in question.

Henry R. Boston, the author of the first paper is a member of long standing in the Association. He is a graduate of the College of the City of New York and holds the degree of Civil Engineer from Lehigh University. From 1917-19 he was production engineer with the Bethlehem Steel Company and from 1919-24 was connected with Scovell, Wellington & Company. In this connection he gained wide experience in the installation of cost systems. In 1924 he went with the Stevens and Thompson Paper Company and has just recently resigned from that organization to accept a position with the well-known firm, Ames, Emerich and Company where he is associated with another member of long standing, Mr. Wm. A. Sleeper.

Robert D. Pettit has had a long experience in production work having spent several years with the American Locomotive Company before going with the American Steel Foundries as production manager in their Sharon plant in 1910. He was works auditor at their Granite City plant for five years and has also held the position of production efficiency engineer for all plants and assistant works manager for their Alliance plant. He is at present the works auditor for this company's Hammond, Indiana works.

The first paper was delivered before the Utica Chapter while the second was given before the Rockford Chapter.

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## REBUILDING ANTIQUATED COST SYSTEMS

BEFORE we start to talk about rebuilding antiquated cost systems it would be well perhaps for us to define an antiquated cost system. This is rather a difficult thing to do, especially to get a definition which will cover all of the various phases of cost accounting. Some cost systems which I have had to rebuild were ideal from the standpoint of antiquity in that they were something that could be removed from a factory easily and completely and put into a museum. The job of rebuilding in that case is extremely simple, you just wipe the slate clean with one wipe and make a fresh start.

A much more difficult proposition is encountered in a case where the system is not too antique—one that was designed perhaps only six or eight years ago—and has since been ornamented with a few touches by the plant accountant plus a few extra fine personal touches by the factory executives or others. Those are the tough ones. You have to tell the cost man and the others that they were excellent ideas in their time but that they have outlived their usefulness now. At the same time you must appear to agree that their business is "different", but point out that cost fundamentals apply in all lines of manufacture.

Some systems may be antique as regards labor records, some may be weak on production or material records and some may not apply proper burden distribution methods in calculating the cost of the production. Perhaps in trying to define an antiquated cost system the best plan might be to define a modern one, then a system which does not meet the requirements as called for in our definition may be called antique. I should say that a modern cost system is one which is designated to give information regarding all departments of the business accurately and promptly, and the central idea of which is control of costs. This idea of cost control is perhaps responsible in a large measure for the development of cost accounting to its present stage. It certainly is the idea behind the standard cost plan which is the most advanced cost plan today.

Before we go any further in this discussion let us go back into cost accounting history a little and trace briefly its major developments.

Before cost accounting had even obtained a fair start industrial engineers, or as they were called in those days, "efficiency engineers", had made quite some progress in shop management methods, which included planning and routing of work, time study, etc. It was necessary, however, to record not only in time but in dollars the performances obtained under the new conditions in order to make intelligent comparisons.

Naturally the first efforts of costing were centered on labor records but it soon became evident that something had to be done with materials and overhead. Many were the discussions that took place regarding the classification of direct and indirect labor and the methods of allocating various burden charges. Only a relatively few years ago no program of the annual convention of our Association or most of the individual chapters for that matter, seemed to be complete without a session devoted to the debatable points of cost accounting. To be sure there are still debatable points, but we do not hear as much about them as formerly. Our association has done remarkable work in standardizing methods and procedures and in developing the fundamentals of the science.

With a background of knowledge gained during the past few years, anyone who is called upon to do a repair job on an antiquated cost system may have plenty of work on his hands, but certainly should not have to seek far to find the proper methods to be applied to solve the problems.

I do not think that it is necessary for me to tell you in detail what antiquated cost methods are but in my experience I have run across some humorous incidents which would have been more humorous had they not been pathetic from the cost standpoint. The margin between success and failure on some of these rebuilding jobs is very slim and as you can realize, is sometimes as much of a sales proposition as one of cost accounting. Many times the advantages of modern methods are not at first apparent and you must keep your principals sold on the idea right from the start.

To tackle properly this cost repair job, naturally the thing to do is to tackle each of the elements of cost separately. Which of the elements to tackle first depends upon the relative importance of each, but ordinarily it is more difficult to control materials and labor records than those pertaining to burden. Some profes-

sional accountants work on the plan of installing first a complete set of labor records and getting them into full operation for some time before proceeding with materials or burden records. This method has much to recommend it especially if the changes which are made are very extensive. A great many times, however, this can not be done and a certain date is set as the date of change from the old methods to the new. Unless every detail is very carefully thought out in advance, a great amount of confusion is bound to result. Also there is always the danger of holding up production temporarily, and there is nothing that will turn a factory executive against a new cost system as quickly as having his regular flow of production interrupted even temporarily.

I remember one instance when on one of these starting dates there was a dispute between the foremen and the departmental shop clerks in three different departments at the same time, all due to a misunderstanding regarding the procedure to be followed with tickets which were used to follow the jobs through the factory. At that particular moment the cost man was as busy as the proverbial one-armed paper hanger with the hives. It is certainly my opinion that whenever possible new material or labor or burden records should be installed one at a time and the procedure with regard to each set of records be used for some time in order that all difficulties can be ironed out before starting the next set of new records.

I do not think that it is necessary for me to tell you what antiquated materials records are or to go into detail regarding what constitutes good materials records for purposes of control. The fundamentals of this phase of cost work have been explained many times in text and probably in talks before this chapter. I also think that the same applies to labor records. Of course I realize that there is a new crop of cost men coming along each year, to whom there may be something new in a discussion of materials or labor records, but to most of you this would be elementary. The most important feature of both materials and labor records is that they should be so designed that the manufacturing division can maintain a maximum degree of control over these elements of cost. The control feature applies not only to the amounts of material used for each article made but also to the control of purchases of materials, and the inventories of finished or semi-finished parts. You

can see readily what an invaluable aid such records are to the purchasing and the production departments, as well as for cost purposes.

This leaves the element of burden and the distribution of the various factors which make up this element to the cost of the product. Here we may have some difficult problems to solve and for which no general rules can be laid down. To us who are constantly in touch with cost work it may be a simple matter to develop a machine hour rate, but we know that in arriving at the final hourly rate we have prorated some items of expense on an arbitrary basis. It is surprising to find how many factory executives know absolutely nothing about how a machine hour rate is arrived at even in a general way. However, this condition is improving and I think that we may say that executives are becoming more cost minded.

I can not mention all of the examples of antiquated methods of burden allocation which have come to my notice. It is at this point that we have to consider such things as normal operating hours, normal burden, excess capacity, etc. and of course each plant presents its own problems.

Many plants have systems in operation today which give a very accurate picture of factory operations but still are antiquated simply because of the fact that the system is used for purposes of records. The best way of using cost as a means of control is through the standard cost plan. This standard cost plan is not at all new but its acceptance and application have been rather slow throughout industry in general. A knowledge of the theory of cost accounting is perhaps more necessary in standard costs than in any of the other cost plans. It sometimes is very difficult to explain to the factory executives the difference between a burden variance and a variance from standard cost. They are the same only different. It is true that the accounting involved in the operation of a standard cost plan is sometimes more complicated than in other cost plans but at the same time the clerical labor involved is nearly always a great deal less and the results of plant operation are shown in a much more illuminating manner. Of what use is it to know that a certain product cost more to make this month than it did a month ago unless we know what to measure both performances against? For all we know from these rec-

ords both month's cost may have been above what they should have been when measured against the proper standards. Needless to say, in applying the standard cost idea it should be applied to all of the cost elements, materials as well as labor and burden.

Even a standard cost system may be antiquated. It is certainly antiquated if the standards are not changed frequently enough to reflect changed conditions in the factory. In my opinion standards should be reviewed at least once a year and oftener if necessary. Of course there is always the danger of confusing the entire picture if standards are changed too frequently and this should be guarded against. In one of the departments of the paper mills with which I was connected at one time we started a new department and began by setting the standards which the production man had estimated could be attained. Naturally they were not attained the first few months but we did not change the standards for that reason. Instead the standards set acted as a spur to the production man to attain and even better his own figures. By showing up such situations by means of standards, better results are usually obtained than by old cost recording methods.

Naturally the task of setting standards varies with different industries. In tackling this job, the cost man must call upon the production and sometimes the time study man for assistance. The problem is more simple in industries making only a few products than in one making many products. In paper mills there are all varieties of this problem one mill making only about six grades and the others making a great many varieties. One of the most difficult industries that I have run across was that of a metal stamping plant which made literally thousands of different items; anything from a tin plate to a large wash boiler. The problem of setting standards in a plant such as this was solved by making a complete study of each article as it went through the various manufacturing operations. This took a long time to do and was complicated by things such as short and long runs, scrap problems, etc. However, when it was completed, as a result of savings that had been effected as a result of cost studies, the management was convinced of the desirability of having a well organized production control department, with time study men, job despatchers, etc.

You can see that this job of rebuilding cost systems nearly always leads to other things such as I have just mentioned. When

I first started in professional work the cost accountant many times was called on to organize a production control department. Now, however, that has become almost a separate profession and has been highly systematized in many plants, notably in the automobile industry.

Now, to go a step further, what happens to the information gathered by means of the cost system? Since the central idea of the cost plan is for the purpose of control it follows that the information which has been gathered should be used for this purpose; not historical purposes, but for the purpose of pre-determining the performances and then measuring the actual performance against the pre-determined.

This involves the use of a budget covering the entire activities of the company beginning, of course, with sales. The procedure in budget making has been explained to you before so that I need not dwell upon that now. Indeed, as you know, it is a subject worthy of a whole evening's discussion.

The problem of budget making and the task of getting all departments of a business to cooperate in living up to it are sometimes worthy of the diplomatic talents of an Ambassador. Usually the administration and preparation of the budget is in the hands of the comptroller or treasurer but the cost accountant has plenty of work to do in getting the necessary information together.

In the last year or two we have heard a great deal about the distribution of selling and administrative expense to cost and I think that I can safely say that the cost plan which does not attempt to do this in some scientific way can be classed as antiquated. I say "attempt" because I have very seldom seen or heard of plants which do this in as scientific a manner as is done with factory or production costs. We are told that the same fundamental methods must be applied in this as in the determination of factory production costs, but while this is very well, the practical solution is not nearly so simple as it sounds. For example, how should the cost of advertising tires be distributed to the various sizes of tires made—sizes varying anywhere from the overgrown rubber bands used on Fords or the oversized truck tires. Shall it be on the basis of the number of tires of each size sold or on the dollar value of the sales of each size? I know of one company which makes paper towels, napkins, toilet paper and one or two other allied

lines. All of these lines were advertised nationally in the regular publications but all of the articles were advertised together. The discussion grew so hot regarding the cost of advertising these grades and the returns therefrom that it was decided to advertise each product separately and maintain separate cost records on each product so as to compare it with the sales. It took only a very short time to demonstrate that advertising paper towels to the public was almost a complete waste of money, and that the advertising of a high grade of toilet paper was bringing in better results per dollar of advertising spent than that spent on a cheaper grade. Hence the advertising on the higher grade was increased and that on the lower grade decreased. In this case, the advertising department was the one that claimed most of the credit for making the savings which were realized but in the final analysis it was admitted that it was the cost man who had brought up the question in the first place and started the whole thing moving. There is no question but that cost men will be called upon to solve this sales and administrative expense problem within the next few years for the very simple reason that, as we have seen manufacturing costs being reduced in most industries during the last few years, the costs of distribution have mounted higher and higher. In many cases they are becoming a positive burden to industry and result in many cases in higher prices to the consumer and lower profits to the manufacturer. Industry demands that methods be found to analyze these costs and measure the returns obtained for money expended. I know that this problem will be solved by the cost man working in conjunction with sales experts, advertising men, etc., just as factory cost problems have been solved with the aid of time study men and production control men.

So much for the past and the present. What about the future?

To some extent we must measure the future by the progress of the past and I think that the progress of the science of cost accounting can be measured in a way by observing the programs of our National Conventions. The first few conventions naturally were given over to the discussion of specialized phases and problems of cost work. The scope of the conventions, however, gradually grew broader and broader until this year the convention was centered about the subject of organizing a business for profit.

No industry can survive without intelligent planning for the

future. Some splendid examples of this are seen in some of our largest industries. As you may know, the A. T. & T. Co. have laid out a budget for new construction which is always five years in advance of their current position. Other companies lay out programs for two or three or even more than five years. So far our standard cost plans are laid out in most cases only about a year in advance and sometimes less. I believe that we should certainly work toward extending the time limits of our budgets and standard cost plans.

Nearly every day we hear of new books on various phases of business activities and nearly every author coins new phrases to describe some phase of the present so called industrial revolution. Thus we hear, among others, the terms "dynamic control" of industry as contrasted with "static control". The difference might be explained in popular language by saying that it contrasts the "go-getters" against the "stay-putter". Certainly a modern cost system embodying the well planned business budget and the standard cost plan for manufacturing and selling as well as the other departments of the business represents one form of dynamic control. There must be constant research work in costs as there is in chemistry or electricity or marketing methods or any other of the various activities of modern business. The most fertile field for this research at the present time, is, as I have indicated before, that of selling and administrative cost.

The committee which Pres. Hoover appointed to make a study of recent economic changes rendered its report a short time ago. It comprises several volumes and is itself a most excellent piece of work. After analyzing many industries and showing the progress made in each, the committee concludes that the most outstanding development in the past few years has been the increased "tempo" or speed of business. This is reflected not only in increased speed of productive activities but in an increased rate of turnover of the sales dollar.

The Hoover committee also went on to state that this country had more potential productive capacity at present than could be readily absorbed into consumer channels. Hence a critical point is reached where, in order to prevent the slump which inevitably follows, it requires that industry be maintained in a state of balance as between production and consumption.

These findings raise the question: What of cost accounting of the future? My idea is that cost accountants should be more economists and less accountants and that there should be more of scientific research than systematic recording.

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## PUNCHED HOLE ACCOUNTING

A development in cost accounting is in use at our plant by means of tabulating equipment. Generally, this consists of a punch, sorter and tabulator. By means of these, data concerning details of labor, materials, expense, shipments, receipts and the classification, addition, subtraction, multiplication and tabulation of these may be accomplished. This is done by first establishing a system or code of numbers for each division of the work to be handled. For example, in a plant where there are ten or less main departments they may be numbered from 0 to 9 and these numbers used wherever the department is referred to.

Labor is usually divided into two main sections, such as direct and indirect. By assigning numbers, from each of these groups, to the varied details of both direct and indirect labor we would have something like the following for the department number one:

101—Shearing
102—Punching
103—Steam Hammer Forging
104—Drop Hammer Forging
105—Helve Hammer Forging
106—Upsetter Forging

and so on up to 125 for various kinds of forging and smith work. Then numbers 126 to 149 might be used for details of machining labor such as:

126—Lathe Work
127—Planer Work
128—Shaper Work
129—Drilling

Further, numbers 151 to 199 might show similar details of indirect labor in the same department.

It is likewise desirable to record data regarding equipment in the plant both as to the cost of upkeep and repair as well as the number of hours operated or inactive in a given period. In a plant where there are 99 or less kinds of groups of equipment by name they might be numbered as follows:

01—Shears
02—Punches
27—Planer
78—Assembly Press, Hydraulic

and by combining with the department number have the following:

011—Shears in Department One
273—Planer in Department Three
785—Press in Department Five

Further, supposing that there might be a number of each kind of equipment in each department, it then becomes necessary to allocate information to each separate unit. This is accomplished by assigning numbers to each one which gives us:—

01101—for number 1 Shear in Department 1
27309—for number 9 Planer in Department 3
78516—for number 16 Press in Department 5

This numbering scheme expressed generally means that the first two digits to the left show the kind of equipment, the middle digit the department in which located, and the last two digits to the right the serial number of a particular kind of equipment within a specific department.

All of the above is simple and easier of application than it would appear. The product manufactured may be classified by numbers, such as:—

2201—Bolsters in lots under 50 pieces
2209—Bolsters in lots over 5000 pieces
2301—Brake Beams in lots under 50 pieces
2409—Coil Springs in lots over 5000 pieces

There are many additional means of assigning numbers for illustrating statistical and accounting data. The numbers when used are easy to remember and save much time and writing instead of detailing all the information by descriptive names.

The initial proceeding is that of punching a card. This card

must be of standard size, thickness and quality of paper and is supplied printed with suitable headings. The underlying basis of the card and its use in the several machines are forty-five vertical columns of numbers each reading from 0 to 9.

When the cards are designed for a particular business, a study is made so as to reduce the number of digits required by each set of classification numbers. These are called fields and may consist of from one to eight digits or vertical columns of numbers (0 to 9 as referred to before). Various colors and combinations of cards are used each of which may be printed with an endless variety of fields and headings with combinations of columns suitable for the intended purpose. One hole only is punched in a column.

The punch is arranged with keys 0 to 9 and automatically spaces from column 1 to 45 immediately following the punching of each hole, somewhat similar to a typewriter. A good operator can punch two thousand cards in eight hours, and an expert over twenty-five hundred cards. Each card may contain from five to thirty classifications of information. It is obvious that no such amount of work could be done by hand posting on sheets or books of record. The punches are operated manually or electrically.

The sorting machine, electrically operated, sorts cards to each digit (0 to 9) in any one column. To completely sort a classification consisting of four vertical columns, four assortments are required. First, the units column, then the tens, hundreds and thousands with the result that on the completion of the fourth assortment the cards are in strict numerical order. This is done at the rate of 400 cards per minute.

This speed is possibly due to the use of electrical magnetism supplied through contacts or brushes. As a card passes through the sorter the electrical contact is broken except for the instant that the punched hole passes the brush. Sufficient current then passes through so that chute O, or one or two up to nine, is thrown out to catch the card and convey it to its respective rack.

The final operation is that of tabulation. The newer machines consist of from five to nine adding or tabulating mechanisms and a printing attachment in one self-contained machine. By an ingenious arrangement resembling a telephone switchboard, the punched data in any field may be transferred to any one of the adding machines and from them to the printing attachment. The

printing tabulator has the appearance of a combined typewriter and five or more adding machines.

This entire machine is actuated by electrical energy. A motor to move certain of the parts such as the automatic feed, rollers, etc., and electric current to supply impulse to the electro magnets. The cards are placed in large quantities in a rack and are fed through at the rate of 150 per minute. Somewhat like the sorter, the cards pass through two sets of contacts or brushes, 90 in number. The electric contact is broken as the card is a non-conductor except for the instant that the punched hole appears. The contact made for this instant sends the required electrical energy to any one of the desired adding banks. The capacity of a five-bank machine is 750 separate amounts every minute. Each amount might have eight digits in it or a total of 1,200 in one field or adding bank, or 6,000 for all five adding sections per minute.

One of the newest features is that of the automatic control and restart of the machine. For instance, one may have classifications for each number from 1 to 500 and have about 100 cards for each division with several fields of figures in varying amounts. The machine will accumulate the amounts in each field for classification one, and when the last of the cards for number one is reached the machine stops and records, on a wide tape or sheet, the data for each field by means of the printer. All five separate amounts, or less, are shown as desired. Then without further attention the mechanism starts automatically and goes on with number two until the last card is reached. The only stopping is for the placement of fresh cards in the feed rack and the removal of cards from the finished section.

For one of our divisions these machines are used for compiling semi-monthly and monthly payroll, labor distribution and labor statistics; accumulating requisitions for monthly reports of product materials, stores, and expense; monthly inventories of work-in-process and gathering all the monthly figures from which the yearly cost statements together with all yearly inventories are prepared. This requires the use of about 4,000 cards per day.

For labor a separate service card is prepared for each job worked on each day, but may cover from one to four men on the same job whether piece work or day work. This service card is the standard tabulator size, but especially printed and columned.

For payroll purposes it is necessary to have a separate tabulator card for each employee. Cards for standard parts are prepared beforehand by a machine which prints at one operation the description, piece number, operation, next operation, to make piece number, drawing number, gauge number, die or jig number and gross piece work price. This gives the employee complete information as to the work he is to perform.

The number of pieces to be done and other hand written data is supplied by the despatch clerk who also stamps the starting and stopping time by means of an electric job recording stamp. All time is shown in hours and tenths of hours and the recorder shows the time by a system in which one o'clock p.m. is thirteen o'clock, and four p.m. is sixteen o'clock, and so on to twenty-four.

After the service cards are checked with the clock card rings and proved as to correctness in every way they are added for the eight important factors, sixty cards on a sheet. The cards are now punched, each group of sixty being kept intact, and then listed through the tabulating machine. If the punching has been done correctly the totals of the two lists will agree. If they do not, the incorrectly punched card is promptly detected and correction made by punching a new card in its place.

All of this is so easily and systematically done that we can, between four and five p.m. of one day, know the exact earnings, gross payroll and distribution of charges for the day before. However, the cards are filed and usually not further considered until the end of the pay period at which time there is an average of four cards per employee per working day, or about fifty-two cards. As soon as the cards are all in, checked, and punched correctly they are all sorted by employee number and the actual payroll prepared. The cards feed through and without any attention of the operator stop automatically at the last card of each employee and print the employee number, the totals as to hours worked (showing hours and tenths of hours), gross earnings, deductions and net earnings. These amounts are checked to the penny with the amounts independently shown on the clock cards, then footed and summarized.

The deductions are applied covering E.B.A., stores, advances, payoffs, etc., by means of a special card on which is punched the actual deduction and same amount in complement. The latter means the sum to be deducted subtracted from one million, the

extra digits of nine being accomplished by special plugging from the nine punched in column four.

Following the completion of the payroll for the first half of a month, all of the tabulator cards are re-sorted by labor distribution accounts to charge and the distribution for that period tabulated in all detail and printed on the tape. From this tape summary cards are punched and fully checked. The summary cards are then held intact until the end of the month at which time they are sorted in with the service cards for the last half month together with salary roll amounts for the whole period.

We usually have the payroll for the latter period completed and the distribution for the month ready to type directly on the monthly report during the morning of the second day of each month. This would be accomplished earlier except for the fact that in the meantime we have finished punching all requisitions for the month and have drawn off a tape of the complete detail of the material and stores used. This data, all ready for typing, is tabulated on the tape during the morning of the first day. This shows a complete summary by both accounts to charge and accounts to credit, balancing to the penny, and the labor distribution balances exactly with the payroll.

For materials, requisitions originating in each of the department offices cover every item of material or stores used for production, assembly, maintenance, shop supplies, etc. We average about 4,500 material cards per month. Each item has shown either a piece, pattern or symbol number which identifies the exact kind or size of material which, in turn, is punched in the field entitled "piece number".

In addition, the material cards are used for computing production for the month. When tabulated with cards representing the opening balance in the shop at the first of a month and cards representing shipments during each month, punched in complement, we obtain the net balance on hand at the end of a month as to material, quantities and price for each part in process.

By means of similar opening balance cards and shipment cards used in connection with the service cards for direct labor we obtain the net value of labor applied on the parts in process at the end of each month expressed for each part and each operation thereon,

number of pieces and price. When compiled, the result is first shown on the tape which averages about 40 yards each month.

We then punch, for both the material and labor, opening balance cards and apply the scheme called "Digit Inventory", which multiplies the number of pieces times the weight or price and gives us the total result of some 4,000 multiplications, fully checked and totaled, in about one hour's time.

There are too many other conveniences and short cuts for detailed information, to include in a short article, but if care is exercised in the original card design so that information is punched at the outset in full detail, then, later any variety of statements can be prepared. For example, a symbol number is applied to each kind of materials and stores. After each month we can supply a department head with a list in detail of the shop supplies used the previous month, such as:—

| *Symbol No.* | *Amount* | *Description* |
|---|---|---|
| 95063 | 16.67 | Chasers |
| 95069 | 6.15 | Cloth, Emery |
| 95071 | 26.84 | Compound, Welding |

The work at our plant covers many details, with ten general divisions of costs of products. For this there are provided 343 accounts divided as to 565 operations, 6,709 classifications, 5,398 piece parts, and 4,724 kinds of material by symbol number. Through the use of the tabulator we have been able to furnish more promptly a greater volume of satisfactorily detailed information with *four less people in our clerical staff.*

When equipment such as described above is first considered the complications involved appear to be considerable. However, we have experienced but little difficulty throughout our use of tabulator equipment and believe it can be adapted to all cost, statistical and accounting problems where a volume of detail is involved.

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